

REMARKS

Claims 1-28 and 34 are pending in the application. Claims 1-28 and 34 have been examined and are rejected. Claims 1, 16, 17, 19 and 34 have been amended to more clearly define the invention. Reconsideration and allowance of the claims are respectfully requested.

THE CLAIMS

Objected to Claims 16 and 17

Claims 16 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 16 and 17 have each been amended to independent form and to include some of the limitations of base claim 1. Applicant submits that claims 16 and 17 are now allowable.

Rejection of Claims 1, 19 and 34 Under 35 U.S.C. §112, Second Paragraph

Claims 1, 19 and 34 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The rejection indicates that the terms “a substantial portion” and “a large portion” are indefinite.

Claims 1, 19 and 34 have each been amended to remove the terms “a substantial portion” and “a large portion”. Accordingly, the §112, second paragraph rejection of claims 1, 19 and 34 should be withdrawn.

Rejection of Claims 1, 2, 4-7, 10, 11, 15, 18 and 34 Under 35 U.S.C. §102(e)

Claims 1, 2, 4-7, 10, 11, 15, 18 and 34 stand rejected under 35 U.S.C. §102(e) as being anticipated by Deligne *et al.* (U.S. Patent No. 6,754,623).

Deligne describes removal of ambient noise in speech recognition. The speech signal $S(n)$ includes the clean signal $C(n)$ and ambient music $m_i(n)$, where n is time index and i is the index of the noise sources. The clean signal $C(n)$ is obtained by (a) filtering each music signal $m_i(n)$ with a filter $h_i(n)$, which is shown by the right summation in equation (1), (b) combining all of the filtered signals, which is shown by the

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left summation in equation (1), and (c) subtracting the combined filtered signals from the speech signal $S(n)$. The filter $h_i(n)$ is determined by standard adaptive filter techniques.

Claim 1 of the present invention, as amended, recites:

“A signal processing system used in automobile to suppress noise from a speech signal comprising:

a first signal detector configured to provide a first signal comprised of a desired component plus an undesired component, wherein the desired component includes speech;

a second signal detector configured to provide a second signal comprised mostly of an undesired component; and

a signal processor operatively coupled to the first and second signal detectors and configured to process the first and second signals based on a cancellation technique to suppress correlated undesired component and further based on at least one noise suppression technique to suppress uncorrelated undesired component and to provide an output signal having the desired component and further having the correlated and uncorrelated undesired components suppressed.”

Applicant submits that claim 1 is not anticipated by Deligne for at least the following reasons.

First, Deligne does not disclose “process the first and second signals ... based on at least one noise suppression technique to suppress uncorrelated undesired component,” as claim 1 recites. Deligne appears to suppress correlated noise. The filter $h_i(n)$ for each noise source is determined by turning off all noise sources except for the i -th noise source. The $m_i(n)$ and $S_i(n)$ signals are then collected via the speakers for the i -th noise source and the input device. The $m_i(n)$ and $S_i(n)$ signals are used to derive the filter $h_i(n)$ such that the difference between the filtered signal $\hat{S}_i(n)$ and the collected signal $S_i(n)$ is minimized. The filter $h_i(n)$ thus relies on correlation between the $m_i(n)$ and $S_i(n)$ signals.

The rejection refers to the phrase “separation by decorrelation” mentioned by Deligne and suggests that this teaches the feature noted above for claim 1. This phrase is used in reference to the adaptation of the filter $h_i(n)$, which as noted above is for removal of correlated noise.

Second, Deligne does not disclose “process the first and second signals based on a cancellation technique to suppress correlated undesired component and further based on at least one noise suppression technique to suppress uncorrelated undesired component,” as claim 1 recites. Deligne discloses one method of suppressing ambient noise, which is shown in equation (1). Equation (2) merely shows the condition to derive the filter $h_i(n)$ used in equation (1). In contrast, claim 1 recites using two techniques to suppress correlated as well as uncorrelated undesired components.

For at least the above reasons, Applicant submits that claim 1 of the present invention is not anticipated by Deligne. Claims 2, 4-7, 10, 11, 15 and 18 are dependent on claim 1 and are not anticipated by Deligne for at least the reasons noted above for claim 1. These dependent claims may recite additional features not disclosed by Deligne.

Independent claim 34 recites features similar to those noted above for claim 1. Claim 34 is thus not anticipated by Deligne for reasons similar to those noted for claim 1.

Accordingly, the §102(e) rejection of claims 1, 2, 4-7, 10, 11, 15, 18 and 34 should be withdrawn.

Rejection of Claims 3, 8, 9, and 12-14 Under 35 U.S.C. §103(a)

Claims 3 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Deligne *et al.*

Claim 12 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Deligne *et al.* in view of Pollak *et al.* (Eurospeech 1993).

Claims 9 and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Deligne *et al.* in view of Ashley (U.S. Patent No. 6,453,291).

Claim 14 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Deligne *et al.* in view of Meyer *et al.* (1997 IEEE)

Claims 3, 8, 9, and 12-14 are dependent on claim 1. Deligne does not disclose all elements of base claim 1 for the reasons noted above. Hence, Deligne is an insufficient basis for the §103(a) rejection of claims 3, 8, 9, and 12-14.

Accordingly, the §103(a) rejection of claims 3, 8, 9, and 12-14 should be withdrawn.

Rejection of Claims 19, 20, 22 and 28 Under 35 U.S.C. §103(a)

Claims 19, 20, 22 and 28 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Deligne *et al.* in view of Ashley.

Applicant submits that claim 19 is patentable over Deligne in view of Ashley for at least the following reasons.

First, Deligne does not disclose “a noise suppression unit ... to suppress uncorrelated undesired component in the intermediate signal based on a spectrum modification technique,” as recited in claim 19. Deligne appears to suppress correlated noise, as noted above.

Second, Deligne does not disclose “an adaptive canceller ... to suppress a portion of the undesired component in the first signal that is correlated with the undesired component” AND “a noise suppression unit ... to suppress uncorrelated undesired component,” as recited in claim 1. Rather, Deligne discloses one method of suppressing ambient noise.

For at least the above reasons, Applicant submits that claim 19 of the present invention is patentable over Deligne in view of Ashley.

Claims 20, 22 and 28 are dependent on claim 19 and are patentable over Deligne in view of Ashley for at least the reasons noted above for claim 19. These dependent claims may recite additional features not disclosed by Deligne or Ashley.

Accordingly, the §103(a) rejection of claims 19, 20, 22 and 28 should be withdrawn.

Rejection of Claims 21 and 23-27 Under 35 U.S.C. §103(a)

Claims 21, 24 and 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Deligne *et al.* in view of Ashley and further in view of Boll (1979 IEEE).

Claim 23 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Deligne *et al.* in view of Ashley and further in view of Meyer.

Claims 26 and 27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Deligne *et al.* in view of Ashley and further in view of Meyer and Boll.

Claims 21 and 23-27 are dependent on claim 19. The combination of Deligne and Ashley does not disclose all elements of base claim 19 for the reasons noted

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above. Hence, the combination of Deline and Ashley is an insufficient basis for the §103(a) rejection of claims 21 and 23-27.

Accordingly, the §103(a) rejection of claims 21 and 23-27 should be withdrawn.

CONCLUSION

Applicant believes all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (650) 289-0600.

Respectfully submitted,



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